

XIX. *Observations on the Sugar Ants. In a Letter from John Castles, Esq. to Lieut. Gen. Melvill, F. R. S.*

Read May 22, 1790.

THE Sugar Ants, so called from their ruinous effects on the sugar-cane, first made their appearance in Grenada about twenty years ago on a sugar plantation at Petit Havre, a Bay five or six miles from the town of St. George, the capital, conveniently situated for smuggling from Martinique. It was therefore concluded, they were brought from thence in some vessel employed in that trade; which is very probable, as colonies of them in like manner were afterwards propagated in different parts of the island by droghers, or vessels employed in carrying stores, &c. from one part of the island to another.

From thence they continued to extend themselves on all sides, for several years; destroying in succession every sugar plantation between St. George's and St. John's, a space of about twelve miles. At the same time, colonies of them began to be observed in different parts of the island, particularly at Duquesne on the north, and Calavini on the south side of it.

All attempts of the planters to put a stop to the ravages of these insects having been found ineffectual, it well became the legislature to offer great public rewards to any who should discover a practicable method of destroying them, so as to permit the cultivation of the sugar-cane as formerly. Accordingly,

an Act was passed, by which such discoverer was entitled to twenty thousand pounds, to be paid from the public treasury of the island.

Many were the candidates on this occasion, but very far were any of them from having any just claim: nevertheless, considerable sums of money were granted, in consideration of trouble and expences in making experiments.

In Grenada there had always been several species of ants, differing in size, colour, &c. which however were perfectly innocent with respect to the sugar-cane. The ants in question, on the contrary, were not only highly injurious to it, but to several sorts of trees, such as the lime, lemon, orange, &c.

These ants are of the middle size, of a slender make, of a dark red colour, and remarkable for the quickness of their motions; but their greatest peculiarities were, their taste when applied to the tongue, the immensity of their number, and their choice of places for their nests.

All the other species of ants in Grenada have a bitter musky taste. These, on the contrary, are acid in the highest degree, and, when a number of them were rubbed together between the palms of the hands, they emitted a strong vitriolic sulphureous smell; so much so, that, when this experiment was made, a gentleman conceived, that it might be owing to this quality that these insects were so unfriendly to vegetation. This criterion to distinguish them was infallible, and known to every one.

Their numbers were incredible. I have seen the roads coloured by them for miles together; and so crowded were they in many places, that the print of the horses feet would appear for a moment or two, till filled up by the surrounding multitude. This is no exaggeration. All the other species of ants,

although numerous, were circumscribed and confined to a small spot, in proportion to the space occupied by the cane ants, as a mole hill to a mountain.

The common black ants of that country had their nests about the foundation of houses or old walls; others in hollow trees; and a large species, in the pastures, descending by a small aperture under ground. The sugar ants, I believe, universally constructed their nests among the roots of particular plants and trees, such as the sugar-cane, lime, lemon, and orange trees, &c.

The destruction of these ants was attempted chiefly two ways; by poison and the application of fire.

For the first purpose arsenic and corrosive sublimate, mixed with animal substances, such as salt fish, herrings, crabs, and other shell-fish, &c, were used, which was greedily devoured by them. Myriads of them were thus destroyed; and the more so, as it was observed by a magnifying glass, and indeed (though not so distinctly) by the naked eye, that corrosive sublimate had the effect of rendering them so outrageous that they destroyed each other; and that effect was produced even by coming into contact with it. But it is clear, and it was found, that these poisons could not be laid in sufficient quantities over so large a tract of land, as to give the hundred-thousandth part of them a taste, and consequently they proved inadequate to the task.

The use of fire afforded a greater probability of success; for (from whatever cause) it was observed, that if wood, burnt to the state of charcoal, without flame, and immediately taken from the fire, was laid in their way, they crowded to it in such amazing numbers as soon to extinguish it, although with the destruction of thousands of them in effecting it. This part of  
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their history appears scarcely credible; but, on making the experiment myself, I found it literally true. I laid fire, as above described, where there appeared but a very few ants, and in the course of a few minutes thousands were seen crowding to it and upon it, till it was perfectly covered by their dead bodies. Holes were therefore dug at proper distances in a cane piece, and fire made in each of them. Prodigious quantities perished in this way; for those fires, when extinguished, appeared in the shape of mole hills, from the numbers of their dead bodies heaped on them. Nevertheless they soon appeared again as numerous as ever. This may be accounted for, not only from their amazing fecundity, but that probably none of the breeding ants, or young brood, suffered from the experiment.

For the same reason, the momentary general application of fire by burning the cane trash (or straw of the cane) as it lay on the ground, proved as little effectual; for although, perhaps, multitudes of ants might have been destroyed, yet in general they would escape by retiring to their nests under cover, and out of its reach, and the breeding ants, with their young progeny, must have remained unhurt.

Mr. SMEATHMAN (who wrote a Paper on the Termites, or White Ants, of Africa, and was at Grenada at this time) imagined, that these ants were not the cause of the injury done to the canes. He supposed, it was owing to the blast, a disease the canes are subject to, said to arise from a species of small flies, generated on their stems and leaves; and that the ants were attracted in such multitudes merely to feed on them.

There is no doubt, that where this blast existed it constituted part of the food of the ants: but this theory was overthrown, by observing, that by far the greatest part of the injured canes had no appearance of that sort, but became sickly and  
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withered, apparently for want of nourishment. Besides, had that been the case, the canes must have been benefited instead of being hurt by these insects.

For the cure of the blast, he proposed the application of train oil, which had not the least effect in preventing the mischief, and, if it had, could never have been generally enough used to answer the purpose.

This calamity, which resisted so long the efforts of the planters, was at length removed by another, which, however ruinous to the other islands in the West Indies, and in other respects, was to Grenada a very great blessing, namely, the hurricane in 1780; without which it is probable the cultivation of the sugar-cane in the most valuable parts of that island must have in a great measure been thrown aside, at least for some years. How this hurricane produced this effect has been considered rather as a matter of wonder and surprize than attempted to be explained. By attending to the following observations, the difficulty I believe will be removed.

These ants make their nests, or cells for the reception of their eggs, only under or among the roots of such trees or plants as are not only capable of protecting them from heavy rains, but are at the same time so firm in the ground as to afford a secure basis to support them against any injury occasioned by the agitation of the usual winds. This double qualification the sugar-cane possesses in a very great degree; for a stool of canes (which is the assemblage of its numerous roots where the stems begin to shoot out) is almost impenetrable to rain, and is also, from the amazing numbers and extension of the roots, firmly fixed to the ground. Thus, when every other part of the field is drenched with rain, the ground under those stools will be found quite dry, as I and every other planter must have observed

observed when digging out the stools in a cane piece, to prepare for replanting. And when canes are lodged or laid down by the usual winds, or from their own luxuriance, the stools commonly remain in the ground; hence, in ordinary weather, their nests are in a state of perfect security.

The lime, lemon, orange, and some other trees, afford these insects the same advantages, from the great number and quality of their roots, which are firmly fixed to the earth, and are very large; besides which, their tops are so very thick and umbrageous as to prevent even a very heavy rain from reaching the ground underneath.

On the contrary, these ants nests are never found at the roots of trees or plants incapable of affording the above protection: such, for instance, is the coffee-tree. It is indeed sufficiently firm in the ground, but it has only one large tap root, which goes straight downwards, and its lateral roots are so small as to afford no shelter against rain. So again, the roots of the cotton shrub run too near the surface of the earth to prevent the access of rain, and are neither sufficiently permanent, nor firm enough to resist the agitation by the usual winds. The same observation will be found true with respect to cacao, plantains, maize, tobacco, indigo, and many other species of trees and plants.

Trees or plants of the first description always suffer more or less in lands infested with these ants; whereas those of the latter never do. Hence we may fairly conclude, that the mischief done by these insects is occasioned only by their lodging and making their nests about the roots of particular trees or plants. Thus the roots of the sugar-canes are somehow or other so much injured by them, as to be incapable of performing their office of supplying due nourishment to the plants,  
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which therefore become sickly and stunted, and consequently do not afford juices fit for making sugar in either tolerable quantity or quality.

That these ants do not feed on any part of the canes or trees affected seems very clear, for no loss of substance in either the one or the other has ever been observed; nor have they ever been seen carrying off vegetable substances of any sort. The truth of this will farther appear by the following fact.

A very fine lime-tree, in the pasture of Mount William estate, at a considerable distance from any canes, but near the dwelling house, had sickened and died soon after the ants made their appearance on that estate. After it had remained in that state, without a single leaf, or the least verdure, for several months, on examination, a very few ants appeared about it; but when with the manager's permission it was grubbed out, a most astonishing quantity of ants and ants nests, full of eggs, were found about its roots, all of which were quite dead, and many of them rotten.

That this tree constituted no part of their food is quite certain; but, while it continued to afford them proper security for their nests, they still continued their abode.

On the contrary, there is the greatest presumption that these ants are carnivorous, and feed entirely on animal substances; for if a dead insect, or animal food of any sort, was laid in their way, it was immediately carried off. It was found almost impossible to preserve cold victuals from them. The largest carcases, as soon as they began to become putrid, so as that they could separate the parts, soon disappeared. Negroes with fores had difficulty to keep the ants from the edges of them. They destroyed all other vermin, rats in particular, of which they cleared every plantation they came upon, which they probably effected

effected by attacking their young. It was found that poultry, or other small stock, could be raised with the greatest difficulty; and the eyes, nose, and other emunctories of the bodies of dying or dead animals were instantly covered with them.

In the year 1780, many of the sugar estates which had been first infested with these ants had been either abandoned, or put into other kinds of produce, principally cotton; which, as I have above observed, do not afford conveniency for their nests. In consequence, the ants had there so much decreased in number, that the cultivation of sugar had again begun to be re-assumed. But it was very different in those plantations which had but lately been attacked, and were still in sugar. At Duquesne, particularly, at that time they were pernicious in the highest degree, spreading themselves on all sides with great rapidity, when a sudden stop was put to their progress by the hurricane which happened near the middle of October that year. How this was effected, I think, may be explained by attending to the above observations.

From what has been said it appears, that a dry situation, so as to exclude the ordinary rains from their nests or cells, appropriated for the reception of their eggs or young brood, is absolutely necessary; but that these situations, however well calculated for the usual weather, could not afford this protection from rain during the hurricane, may be easily conceived.

When by the violence of the tempest heavy pieces of artillery were removed from their places, and houses and sugar-works levelled with the ground, there can be no doubt that trees and every thing growing above ground must have greatly suffered. This was the case. Great numbers of trees and plants (which resist commonly the ordinary winds) were torn out by the root. The canes were universally either lodged or



twisted about as if by a whirlwind, or torn out of the ground altogether. In the latter case, the breeding ants, with their progeny, must have been exposed to inevitable destruction from the deluge of rain which fell at the same time. The number of canes, however, thus torn out of the ground, could not have been adequate to the sudden diminution of the sugar ants; but it is easy to conceive, that the roots of canes which remained on the ground, and the earth about them, were so agitated and shaken, and at the same time the ants nests were so broken open, or injured, by the violence of the wind, as to admit the torrents of rain accompanying it. I apprehend, therefore, that the principal destruction of these ants must have been thus effected.

Two circumstances tended to facilitate this happy effect. Many of the roots of the canes infected, as above observed, were either dead or rotten, so as not to be capable of making the same resistance to the wind as those in perfect health. And this hurricane happened so very late as the month of October, when the canes are always so high above ground as to give the wind sufficient hold of them, which at an earlier period would not have been the case.

That many of the cane ants were swept off by the torrents of rain into the rivers and ravines, and thus perished, I have no doubt; but if we consider the obstacles to this being very general, it could have had but small effect in considerably reducing their numbers; for on flat land it could not have happened. In hanging or hilly land, the cane trash would afford great shelter, and the ants would naturally retire to their nests for security, when they found their danger.

Some have supposed, that the sugar ants, after a certain time, degenerate, and become inoffensive; and in proof of this, they

they say, Martinique and Barbadoes were freed from their bad effects without a hurricane or any other apparent cause.

The idea of any such extraordinary and unheard-of deviation of nature is too contemptible to deserve an answer; but the reason is obvious. The planters there either abandoned their cane lands, or planted them in coffee, cacao, cotton, indigo, &c. none of which, according to the above observations, afford the ants proper conveniency for the propagation of their species; and therefore their numbers must have so much decreased as to re-admit the culture of the sugar-cane as before. At the same time it is very probable, that this diminution might have in part been owing to something of the hurricane kind; for it is well known, that strong squalls of wind, attended with heavy rains, are frequent in the West Indies, although they do not last so long, nor are so violent, as to deserve the name of a hurricane.

It must not however be denied, that though nature, for a time, may permit a particular species of animal to become so unproportionably numerous as to endanger some other parts of her works, she herself will in due time put a check upon the too great increase; and that is often done by an increase of some other animal inimical to the former destroyers. In the present case, however, nothing of that sort appeared; therefore, when a plain natural cause, obvious to our senses, occurred, by which we can account for the amazing and sudden decrease of those ruinous insects, it is unnecessary to recur to other possible causes, too minute for our investigation.

All I have said on this subject would certainly be of little or no consequence, did it not lead to the true method of cultivating the sugar-cane on lands infested with those destructive

insects; in which point of view, however, it becomes important.

If then the above doctrine be just, it follows, that the whole of our attention must be turned to the destruction of the nests of these ants, and consequently the breeding ants with their eggs or young brood.

In order to effect this, all trees \* and fences, under the roots of which these ants commonly take their residence, should first be grubbed out; particularly lime fences, which are very common in Grenada, and which generally suffered from the ants before the canes appeared in the least injured. After which the canes should be stumped out with care, and the stools burnt as soon as possible, together with the field trash (or the dried leaves and tops of the canes), in order to prevent the ants from making their escape to new quarters. The best way of doing this, I apprehend, will be, to gather the field trash together in considerable heaps, and to throw the stools as soon as dug out of the ground into them, and immediately apply fire. By this means multitudes must be destroyed; for the field trash, when dry, burns with great rapidity. The land should then be ploughed or hoe-ploughed twice (but at least once) in the wettest season of the year, in order to admit the rains, before it is hoed for planting the cane: by these means these insects, I apprehend, will be so much reduced in number as at least to secure a good plant cane.

But it is the custom in most of the West India islands to permit the canes to ratoon; that is, after the canes have once been cut down, for the purpose of making sugar, they are

\* Particular fruit trees may probably be preserved, without detriment, by carefully removing the earth from about their roots, destroying the ants nests, and afterwards replacing either the same or new earth.

suffered to grow up again, without replanting; and this generally for three or four years, but sometimes for ten, fifteen, or twenty. In this mode of culture the stools become larger every year, so as to grow out of the ground to a considerable height, and by that means afford more and more shelter to the ants nests; therefore, for two or three successive crops, the canes should be replanted yearly, so as not only to afford as little cover as possible for the ants nests, but continually to disturb such ants as may have escaped, in the business of propagating their species.

That considerable expence and labour will attend putting this method into execution, there is no doubt. An expensive cure, however, is better than none; but from the general principles of agriculture, I am of opinion, that the planter will be amply repaid for his trouble, by the goodness of his crops, in consequence of the superior tilth the land will receive in the proposed method. Of this we have a proof in the island of St. Kitt's, where they constantly replant their canes yearly: and it is very well known, that an acre of cane land there gives a greater return than the same quantity in any other island. In St. Kitt's, five hogsheads *per* acre is common yielding in good land. In Grenada, from two to three hogsheads from plant canes, and half that quantity from rattoons. Thus, although the St. Kitt's planter cuts only one half of his cane land yearly, in a given number of years he makes a greater revenue than the Grenada planter on the present mode of rattooning, when four-fifths of the cane land is yearly cut.

Some may be of opinion, that it would be more advantageous to change the produce than to pursue the proposed method; on which I shall only observe, that it appears to me, that one half of the usual crop of sugar, thus produced, will

will be more advantageous to the planter (when at the same time progress is making in destroying the sugar ants) than a full crop of any other produce. In some very few situations cotton perhaps may be excepted. As to coffee, it is to be considered that it gives no return till the third year after planting, and not a full crop till the fifth. Cocoa begins to bear in five years; but yields little till the seventh: and indigo not only exceedingly impoverishes the land, but is unhealthy to the negroes. Add to this, that far the greatest part of sugar lands are unfit for the culture of any of these.

It would carry this Letter to too great a length were I to adduce all that may be said on this subject; I shall therefore conclude by observing, that the best proof of the truth of the above doctrine will be the success attending the proposed method of cultivation, or one of the same tendency, *viz.* to attempt the destruction of the nests of these insects, and consequently the breeding ants, with their young broods; for their fecundity appears to be so prodigiously great as to render it altogether impossible to destroy them by poison, which can never be generally enough used to effect that purpose.

